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### ASSIGNMENT BOOKLET 1A

MAT3038 Applied Mathematics 30  
Module 1: Activities 1 to 3 Assignment

#### FOR STUDENT USE ONLY

Date Assignment Submitted:

(If label is missing or incorrect)

Student File Number:

Time Spent on Assignment:

Module Number: \_\_\_\_\_

#### FOR OFFICE USE ONLY

Assigned

Teacher: \_\_\_\_\_

Assignment

Grading: \_\_\_\_\_

Graded by: \_\_\_\_\_

Date Assignment Received: \_\_\_\_\_

#### Student's Questions and Comments

Apply Module Label Here

Name

Address

Postal Code

Please verify that preprinted label is for  
correct course and module.

#### Teacher's Comments

Teacher



# INSTRUCTIONS FOR SUBMITTING THIS DISTANCE LEARNING ASSIGNMENT BOOKLET

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- Are all the assignments completed? If not, explain why.
- Has your work been reread to ensure accuracy in spelling and details?
- Is the booklet cover filled out and the correct module label attached?

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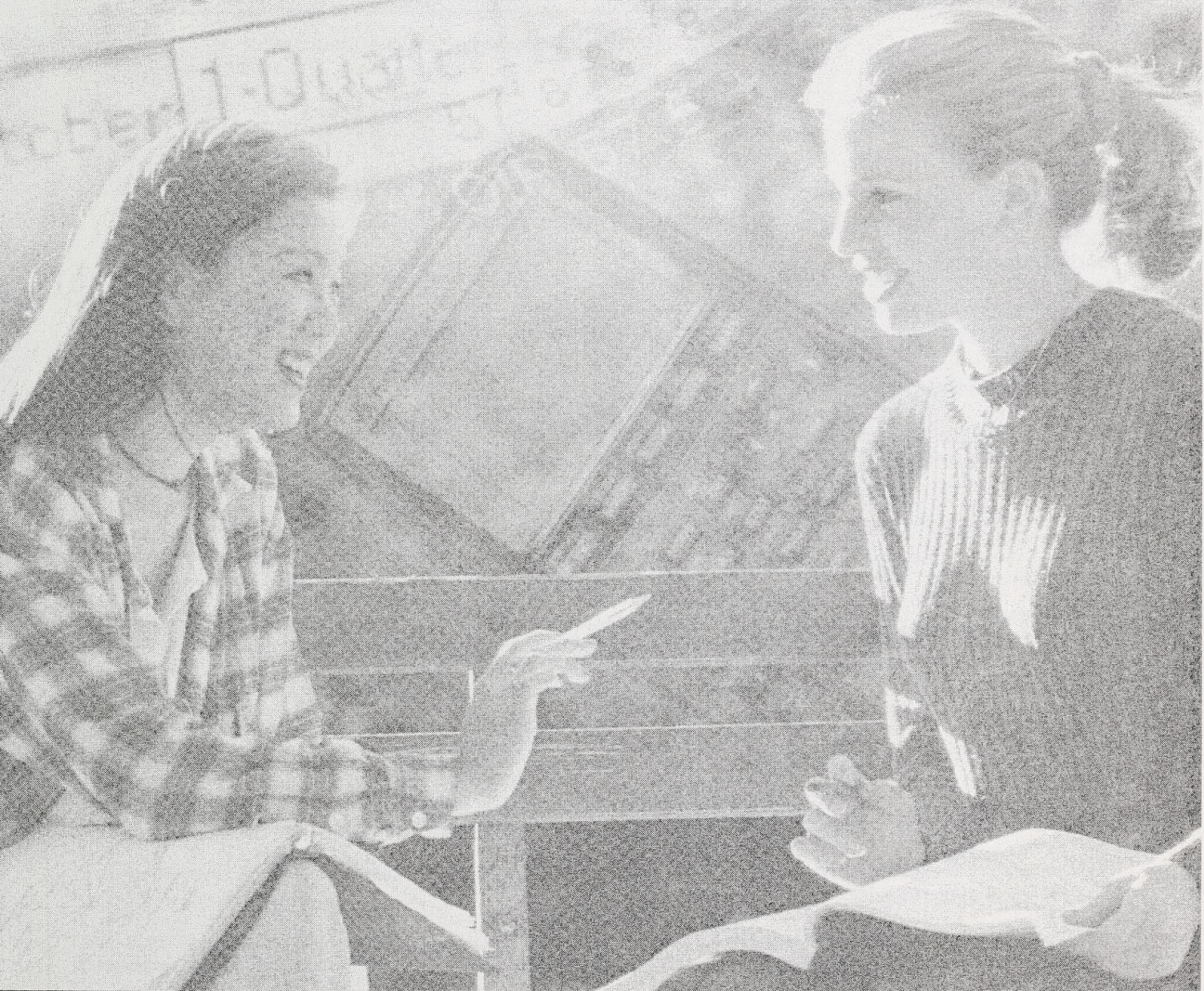


Module  
**1**

# *Applied* *Mathematics 30*

**PROBABILITY**

**ASSIGNMENT BOOKLET 1A**





## FOR TEACHER'S USE ONLY

### Summary

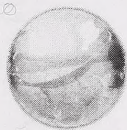
	Total Possible Marks	Your Mark
Activities 1 to 3 Assignment	90	

### Teacher's Comments

Applied Mathematics 30  
Module 1: Probability  
Assignment Booklet 1A  
Activities 1 to 3 Assignment  
Learning Technologies Branch  
ISBN 0-7741-2156-4

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Students	✓
Teachers	✓
Administrators	
Home Instructors	
General Public	
Other	



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**ASSIGNMENT BOOKLET 1A**  
**APPLIED MATHEMATICS 30: MODULE 1**  
**ACTIVITIES 1 TO 3 ASSIGNMENT**

Your mark for this module will be determined in part by how well you do your assignments.

This Assignment Booklet is worth 90 marks out of the total 200 marks for the assignments in Module 1. The value of each assignment and each question is stated in the left margin.

Work slowly and carefully. If you have difficulty, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

90

**Activities 1 to 3 Assignment**

**Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.**

3

1. One card is drawn from a shuffled deck of 52 cards. What is the probability of drawing a red 5? Express your answer as a common fraction and as a decimal rounded to 4 places.

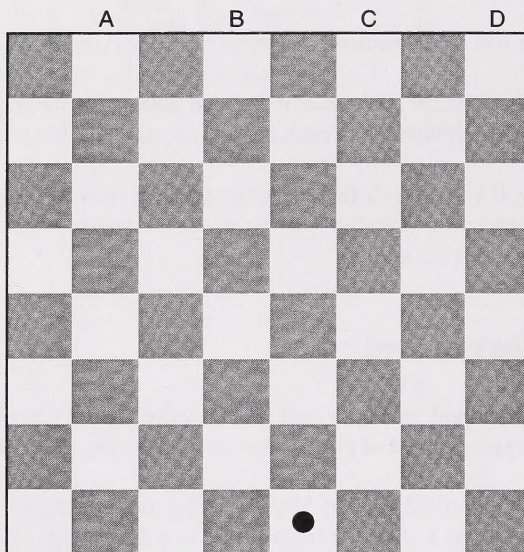
4

2. A traffic light is red for 30 s, amber for 7 s, and green for 23 s. What is the probability that when you first see the light that it will be amber? Express your answer as a common fraction and as a decimal rounded to 4 places.



⑥

3. On the checkerboard given, what is the probability of ending at B if the probabilities of going right or left at any point are equal? Express your answer as a common fraction and as a decimal rounded to 4 places.



Return to page 19 of the Student Module Booklet and continue with Activity 1.

③

4. Two six-sided dice are rolled. What is the probability of each of these events? Express your answers as a common fraction and as a percent rounded to the nearest tenth.
- a. The sum of the two numbers is 7.

- ③      b. The difference between the two numbers is a whole number less than 2.

- ④      5. A nickel is tossed, a six-sided die is rolled, and a penny is tossed. Draw a tree diagram to show the sample space for this experiment.

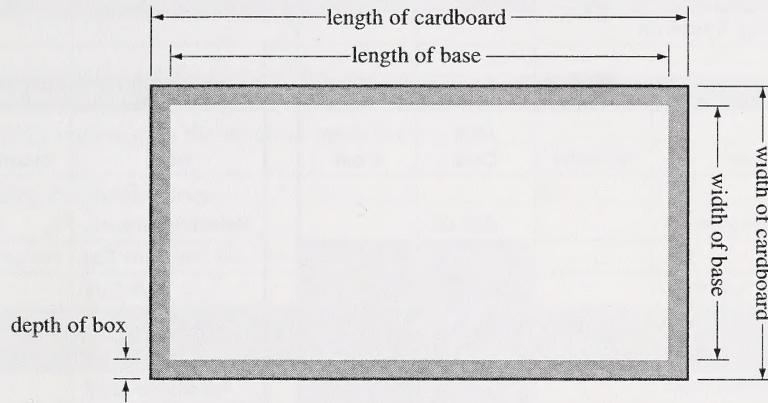






⑥

8. Answer exercise 6 of “Getting Started” on page 140 of the Project Book. Make a simple two-part box. Use the same amount of cardboard for the bottom of the box as for the top of the box. The diagram given shows the piece of cardboard used to make the bottom of the box and how its dimensions relate to the interior size of the finished box. Explain how you arrived at the size of cardboard needed for your container before calculating the costs.





8

9. Answer exercise 7 of “Getting Started” on page 140 of the Project Book. Solve this question for both a single shelving unit and for multiples of four shelving units using the spreadsheet template *SHELVING SYSTEMS* on the Applied Mathematics 30 CD. Fill in the blank template given.

	A	B	C	D	E	F	G	H	I
1	<b>Shelving Systems</b>								
2									
3	<b>Single Shelf Unit</b>					<b>Multiple of Four Shelf Units</b>			
4	<b>Item</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Total Cost</b>		<b>Item</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Total Cost</b>
5	Melamine (sheets)		\$20.00			Melamine (sheets)		\$20.00	
6	Top					Top			
7	Left Side					Left Side			
8	Right Side					Right Side			
9	Fixed Shelf					Fixed Shelf			
10	Adjustable Shelf					Adjustable Shelf			
11	Melamine Edging (inches)					Melamine Edging (inches)			
12	Hardboard (sheets)					Hardboard (sheets)			
13	Finishing Nails					Finishing Nails			
14	Nuts and Bolts (pairs)					Nuts and Bolts (pairs)			
15	Shelf Supports					Shelf Supports			
16	Cardboard (square feet)					Cardboard (square feet)			
17	Plastic Bag					Plastic Bag			
18			<b>Total</b>					<b>Total</b>	
19							<b>Cost of Each Unit</b>		



4

10. Estimate the amount of time required to carry out the following tasks:

Cutting the melamine board: \_\_\_\_\_

Cutting the hardboard: \_\_\_\_\_

Drilling the holes for the shelf supports: \_\_\_\_\_

Drilling the holes for the nuts and bolts: \_\_\_\_\_

Counting and bagging the required small parts: \_\_\_\_\_

Building the packing box: \_\_\_\_\_

Putting the shelf unit into the box: \_\_\_\_\_

Return to page 38 of the Student Module Booklet and continue with Activity 3.

3

11. Jean tossed 4 coins 100 times. The coins landed with 4 heads showing 6 times. Jean estimated that the probability of 4 heads occurring when 4 coins are tossed is 6%. Is Jean's estimation an example of theoretical probability or experimental probability? Justify your answer.

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12. Petra drew a card at random from a standard deck. The card was a black face card.

3

- a. What is the theoretical probability of drawing a black face card? Express your answer as a common fraction and as a percent to the nearest tenth.



④

- b. Use your graphing calculator to simulate 50 trials of this event. How many times did a black face card occur? Outline the keystrokes you used to carry out this simulation, and copy what appears on your display on the blank display given.



①

- c. Use the results in exercise 2.b. to calculate the experimental probability.

②

- d. Compare your results from exercise 2.c. to the theoretical probability. Explain what you would do to obtain an experimental probability that is closer to the theoretical probability.

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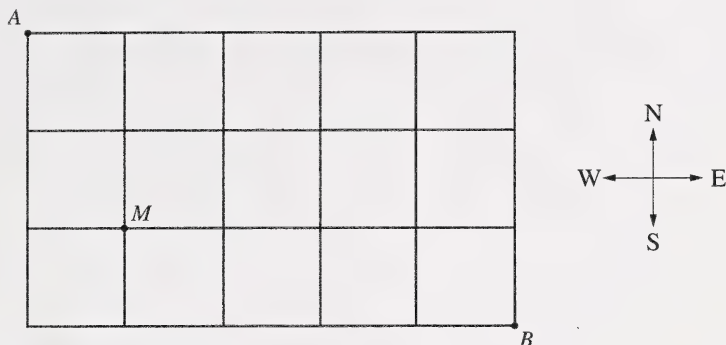
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13. A bakery,  $B$ , is located 5 blocks east and 3 blocks south of Aaron's house,  $A$ .



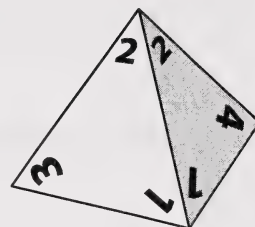
③

- a. If Aaron walks only south or east, how many different ways can he walk to the bakery?

③

- b. If Aaron chooses one of these routes at random, what is the probability it takes him past the music store,  $M$ ?

14. A four-sided (tetrahedral) die with vertices numbered 1 to 4 is rolled, and a coin is tossed.



- a. Use a tree diagram to create a sample space for this experiment.

- b. What is the probability that the die shows an even number or a head turns up on the coin?

15. The first part of a written driver's test consists of 5 multiple-choice items, each with 4 choices. To pass this part of the test, all 5 questions must be answered correctly.

- a. How many different ways can this part of the test be answered?



- ②      b. If a candidate answers this part by guessing alone, what is the probability he or she will fail this part of the test?

16. Use the digits 1, 3, 5, 7, and 9.

- ②      a. If no digit is repeated, how many four-digit numbers are possible?

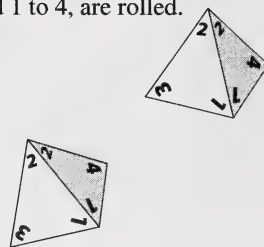
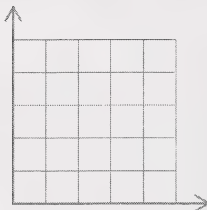
- ②      b. What is the probability that the number generated in exercise 16.a. will end in a 3?

- ①      c. What is the probability that the number generated in exercise 16.a. will not end in a 3?

17. Two four-sided (tetrahedral) dice, each with vertices numbered 1 to 4, are rolled.

②

- a. Use the grid to create a sample space.



②

- b. What is the probability that the sum of the vertices is 5?

③

18. Jenna rolls a fair, six-sided die 4 times. Each time the die shows a 5. What is the probability the die will show a 5 on the fifth roll? Explain.

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**Submit your completed Assignment Booklet 1A to your teacher for assessment.**  
Then return to page 39 of the Student Module Booklet and begin Activity 4.



AL.2.2003-23  
C.2  
V.1 book 13

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**ASSIGNMENT BOOKLET 1B**

MAT3038 Applied Mathematics 30

Module 1: Activities 4 and 5 Assignment, Module Review Assignment, and Module Project

**FOR STUDENT USE ONLY**

Date Assignment Submitted:

\_\_\_\_\_

Time Spent on Assignment:

\_\_\_\_\_

(If label is missing or incorrect)

Student File Number:

\_\_\_\_\_

Module Number: \_\_\_\_\_

**FOR OFFICE USE ONLY**

Assigned

Teacher: \_\_\_\_\_

Assignment

Grading: \_\_\_\_\_

Graded by: \_\_\_\_\_

Date Assignment Received: \_\_\_\_\_

**Student's Questions  
and Comments**

**Apply Module Label Here**

**Name**

**Address**

**Postal Code**

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**Teacher's Comments**

\_\_\_\_\_  
**Teacher**

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Module

1

# *Applied Mathematics 30*

**PROBABILITY**

**ASSIGNMENT BOOKLET 1B**



Learning  
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**Alberta**  
LEARNING

## FOR TEACHER'S USE ONLY

### Summary

	Total Possible Marks	Your Mark
Activities 5 and 6 Assignment	20	
Module Review Assignment	50	
Module Project	40	
	110	

### Teacher's Comments

Applied Mathematics 30

Module 1: Probability

Assignment Booklet 1B

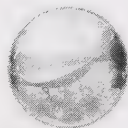
Activities 4 and 5 Assignment, Module Review Assignment, and Module Project

Learning Technologies Branch

ISBN 0-7741-2157-2

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**ASSIGNMENT BOOKLET 1B**  
**APPLIED MATHEMATICS 30: MODULE 1**  
**ACTIVITIES 4 AND 5 ASSIGNMENT, MODULE REVIEW**  
**ASSIGNMENT, AND MODULE PROJECT**

Your mark for this module will be determined in part by how well you do your assignments.

This Assignment Booklet is worth 110 marks out of the total 200 marks for the assignments in Module 1. The value of each assignment and each question is stated in the left margin.

Work slowly and carefully. If you have difficulty, go back and review the appropriate topic.

Be sure to proofread your answers carefully.

20

### Activities 4 and 5 Assignment

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

1. Use the sample space given to answer the questions that follow. Write your answer in decimal form.

	1	2	3	4	5
Q	(Q, 1)	(Q, 2)	(Q, 3)	(Q, 4)	(Q, 5)
H	(H, 1)	(H, 2)	(H, 3)	(H, 4)	(H, 5)
T	(T, 1)	(T, 2)	(T, 3)	(T, 4)	(T, 5)
B	(B, 1)	(B, 2)	(B, 3)	(B, 4)	(B, 5)

3

- a. What is the probability of obtaining an H?

- ③ b. What is the probability of obtaining a 3?

- ③ c. What is the probability of obtaining an H and a 3?

Return to page 41 of the Student Module Booklet and continue with Activity 4.

- ③ 2. a. Using the sample space given in question 1, what is the probability of obtaining an H or a 3? Write your answer in decimal form.

- ② b. Are H and 3 mutually exclusive?

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3. Write your answers to the following questions in fraction form.

- ③ a. What is the probability of rolling neither a 6 nor a 4 on one roll of a six-sided die?



- ③ b. What is the probability of rolling a 1, 2, 3, or 5 on one roll of a six-sided die?

Return to page 51 of the Student Module Booklet and continue with Activity 5.

50

## Module Review Assignment

Read all parts of your assignment carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.

1. Two cards are selected at random from a standard deck. The first card is replaced before the second is drawn. Let  $A$  and  $B$  represent the following events:

$A$ : "The first card is a king."

$B$ : "The second card is a 6 or 7."

- ② a. Classify events  $A$  and  $B$  as dependent or independent. Justify your answer.

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- ② b. Determine  $P(A \text{ and } B)$ .

5

2. A charity sells 500 raffle tickets. There are 5 prizes. The charity advertises that once a ticket is drawn, it is re-entered into the draw and is still eligible for the remaining prizes. Bjorn buys 20 tickets. What is the probability that Bjorn will win at least one prize? Round your answer to the nearest tenth of a percent.

5

3. In Sarai's class, all students take math and English. According to her teachers, the probability that a student completes a mathematics assignment is 80% and the probability that a student completes an English assignment is 75%. The probability that a student completes both assignments is 70%. Are these events dependent or independent? Use a mathematical calculation to support your answer.



4. A bag contains 5 red marbles, 5 white marbles, and 5 blue marbles. A single marble is chosen at random. Let  $A$  and  $B$  represent the following events:

$A$ : "A red marble is drawn."

$B$ : "A white marble is drawn."

②

- a. Are the events mutually exclusive? Why or why not.

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②

- b. Determine  $P(A \text{ and } B)$ .

②

- c. Calculate  $P(A \text{ or } B)$ .

5. A single card is drawn from a standard deck. Let  $A$  and  $B$  represent the following events:

$A$ : "A red card is drawn."

$B$ : "A jack is drawn."

②

- a. Are these events mutually exclusive? Why or why not?

---

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---

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②

b. Determine  $P(A \text{ and } B)$ .

②

c. Calculate  $P(A \text{ or } B)$ .

Answer the remaining questions on the answer sheet provided on page 12 of this Assignment Booklet. The answer sheet is similar to the one that will be used on the Diploma Examination for Applied Mathematics 30. Read the following information before proceeding.

### Multiple Choice

- Decide which of the choices **best** completes the statement or answers the question.
- Locate that question number on the separate answer sheet provided and fill in the circle that corresponds to your choice.

### Example

This assignment is for the subject of

- A. biology
- B. physics
- C. chemistry
- D. mathematics

Answer Sheet

(A) (B) (C) ●



## Numerical Response

- Record your answer on the answer sheet provided by writing it in the boxes and then filling in the corresponding circles.
- If an answer is a value between 0 and 1 (e.g., 0.7), then be sure to record the 0 before the decimal place.
- Enter the first digit of your answer in the left-hand box. Any boxes on the right that are not needed are to remain blank.

### Examples

#### Calculation Questions and Solutions

The value of  $\tan 35^\circ$ , to the nearest tenth, is \_\_\_\_\_.

(Record your answer in the numerical-response section on the answer sheet.)

Calculator value: 0.700 207 5

Value to be recorded: 0.7

Record 0.7 on the answer sheet →

0	.	7	
---	---	---	--

<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	<input checked="" type="radio"/>	7
8	8	8	8
9	9	9	9

A particular matrix operation produces the equation

$$2 \begin{bmatrix} 1 & 0.5 \\ 1.5 & 4 \end{bmatrix} = \begin{bmatrix} a & b \\ c & 8 \end{bmatrix}$$

In the equation above, the value of

$a$  is \_\_\_\_\_ (Record in the **first** column)

$b$  is \_\_\_\_\_ (Record in the **second** column)

$c$  is \_\_\_\_\_ (Record in the **third** column)

(Record all **three digits** of your answer in the numerical-response section on the answer sheet.)

Value to be recorded: 213

Record 213 on the answer sheet →

2	1	3	
---	---	---	--

•	•		
0	0	0	0
1	●	1	1
●	2	2	2
3	3	●	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

### Correct-Order Question and Solution

Four different sets of data produce the following standard deviations.

1	0.3	2	2.4
3	1.6	4	1.9

When these four standard deviations are arranged in order from **lowest** to **highest**, the order is \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

(Record all **four digits** of your answer in the numerical-response section on the answer sheet.)

Value to be recorded: 1342

Record 1342 on the answer sheet →

1	3	4	2
---	---	---	---

•	•		
0	0	0	0
●	1	1	1
2	2	2	●
3	●	3	3
4	4	●	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9



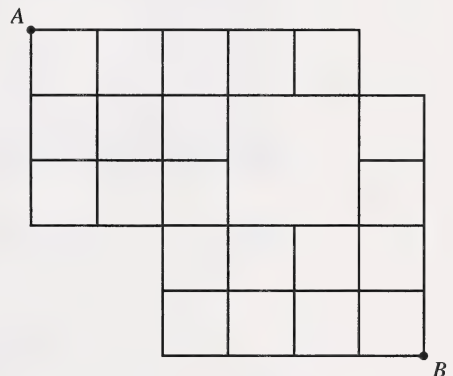
- ② 6. What is the probability of obtaining a sum of 9 when two dice are rolled?
- A. 8%  
B. 11%  
C. 14%  
D. 17%
- ② 7. An experiment involves rolling three octahedral (8-sided) dice and summing the topmost faces. What is the size of the sample space for this experiment?
- A. 24  
B. 192  
C. 512  
D. 1536

**Numerical Response**

- ③ 1. A metal medallion is tossed 200 times. The engraved side lands up 185 times. What is the experimental probability of obtaining the engraved side up? Express your answer as a percentage to the nearest tenth.

(Record your answer in the numerical-response section on the answer sheet.)

- ② 8. How many distinct paths from  $A$  to  $B$  are there in the diagram given if movement is restricted to down and to the right?
- A. 30  
B. 100  
C. 170  
D. 280



**Numerical Response**

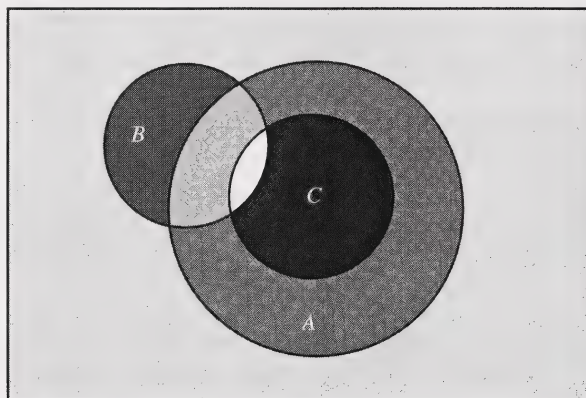
③

2. A florist offers 5 different vases, 2 different types of fern, 3 different feature flowers, and 6 different accent flowers. If you can choose one vase, one type of fern, one feature flower, and one accent flower, how many different bouquets can be made?

(Record your answer in the numerical-response section on the answer sheet.)

②

9. Which pair of events shown in the following Venn diagram are mutually exclusive?



- A. A and B
- B. A and C
- C. B and C
- D.  $\bar{A}$  and C

**Numerical Response**

③

3. What is the probability of getting at least 1 answer correct out of 5 on a true or false test if you guess at each answer? Express your answer to the nearest percent.

(Record your answer in the numerical-response section on the answer sheet.)

- ② 10. Which of the following events are independent?
- i. drawing a 5 from a deck of 52 cards and then drawing another 5 without replacing the first card
  - ii. drawing a 3 from a deck of 52 cards and then drawing another 3 if the first card was replaced
  - iii. drawing a red marble from a bag of red and green marbles and then drawing a green marble, if the first marble was not returned to the bag
  - iv. obtaining a head in a coin toss and rolling a 5 on an eight-sided die
- A. i., ii., and iii.  
B. i. and iii.  
C. ii., iii., and iv.  
D. ii. and iv.
- ② 11. What is the probability of 5 different books being in alphabetical order by title on a shelf if they were randomly placed on the shelf?
- A. 0.0062  
B. 0.0083  
C. 0.0095  
D. 0.0108

**Numerical Response**

- ③ 4. What is the probability of a digit being repeated in a 5-digit number? Express your answer as a decimal to the nearest hundredth.
- (Record your answer in the numerical-response section on the answer sheet.)



## Answer Sheet

6. (A) (B) (C) (D)

7. (A) (B) (C) (D)

8. (A) (B) (C) (D)

9. (A) (B) (C) (D)

10. (A) (B) (C) (D)

11. (A) (B) (C) (D)

### Numerical Response

1.

•	•		
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

2.

•	•		
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

3.

•	•		
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

4.

•	•		
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Return to page 52 of the Student Module Booklet and continue with the Module Review.  
 If your teacher has indicated that the Module 1 project does not need to be completed,  
 submit Assignment Booklet 1B to your teacher for assessment.

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## Module Project: Voice-Mail Security

Your teacher may not require you to complete all the projects in this Applied Mathematics 30 course. Contact your teacher and check whether you need to complete the Module 1 project, Voice-Mail Security, as part of your assessment.

If you are required to complete this project, **read all parts of the project carefully and record your answers in the appropriate places. Clearly show how you arrived at your answers by showing your work.**

The Module 1 project is Voice-Mail Security. You will analyse two voice-mail security proposals for a telephone company. You will decide if these proposals are adequate for the projected number of users, and you will suggest improvements or make alternate proposals.

### 1. Proposal A

In this proposal, the telephone company assigns each voice-mail user a unique, randomly generated, three-digit, four-digit, or five-digit password. Zeros may be used as digits in the password. Also, digits may be repeated, but not all the digits can be the same. (That is, 0405, 12223, and 335 are possible passwords, but 111, 2222, and 77777 are not.)

To answer the following questions, you may wish to refer to your responses to exercises 1 to 4 on page 26 of the textbook and exercises 9 and 10 on pages 46 and 47. You may also refer to the sample responses in the Appendix.

a. Determine the number of passwords possible that have the following.

- i. 3 digits

2

②

ii. 4 digits

②

iii. 5 digits

①

b. What is the total number of passwords possible using this system?

②

c. Are there any numbers that should not be used? Why?

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②

d. The telephone company estimates that there will be up to 100 000 users after 1 year and 250 000 users after 5 years. Will this proposal provide enough passwords? Explain.

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## 2. Proposal B

In this proposal, as outlined on page 27 of the textbook, the telephone company assigns each voice-mail user a unique, randomly generated, four-letter password. The letters in the password are entered by pressing the telephone keypad. As described in the textbook, if the letter is the first letter on the key, press the key once; if it is the second letter on the key, press the key twice; and if it is the third letter on the key, press the key three times.

Remember, two consecutive letters cannot be from the same key. For example, the password FDNY is not permitted since F and D are both on the same key (number 3).

To answer the following questions, you may wish to refer to your responses to exercises 1 to 5 on page 27 of the textbook and exercises 9 and 10 on pages 46 and 47. You may also refer to the sample responses in the Appendix.

③

- a. List two possible passwords and their corresponding number sequences.

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④

- b. How many passwords are possible?

②

- c. The telephone company estimates that there will be up to 100 000 users after 1 year and 250 000 users after 5 years. Will this proposal provide enough passwords? Explain.

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To answer questions 3 to 5, you will need to refer to the data in the table on page 40 of the textbook. You may wish to refer to your responses to questions 9 and 10 on pages 46 and 47 of the textbook and the sample responses in the Appendix.

5

3. If 1000 customers, each with a password consisting of 4 characters, use the voice-mail system on a given day, what is the probability that at least one of these customers will forget his or her password?

4. a. Determine the probability of someone randomly guessing a password if the password is a

②

- i. 4-digit password in Proposal A

②

- ii. 4-letter password in Proposal B

②

- b. Which proposal offers a higher level of security? Why?

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③

- c. What are some other ways the telephone company could improve security of the voice-mail system?

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⑥

5. Based on your analysis of the two proposals, write a recommendation to the telephone company as to which proposal would best fit their needs. Include any suggestions for improvement.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

**Submit your completed Assignment Booklet 1B to your teacher for assessment.**





